

Process Recovery of Carotene from Crude Palm Oil


 Award Winner


Carotenes are yellow to orange pigments found in carrots, leafy vegetables, milk fat and egg yolk. The α - and β -carotenes are associated with synthesis of vitamin A in the liver and may offer some protection against cancer as well. Commercially, carotenes are used in food coloration, vitamin supplements, pharmaceutical and cosmetic products. Although palm oil is rich in carotenes (about 600 parts per million), carotenes are destroyed or discarded by bleaching and stripping operations in the oil refining process. Commercial production of carotenes by chemical conversion of crude palm oil (CPO) results in loss of edible oil. This recovery method involves adsorption chromatography by synthetic polymer adsorbent. By employing this method, carotenes were concentrated up to 100,000 ppm in a two step chromatography operation.



Chromatographic process



Oil fraction

Carotene

The basic component is the chromatography column which is packed with a synthetic porous polymer adsorbent. Of several adsorbents tested, one adsorbent was found which could adsorb the carotene from CPO by the chromatographic column, allowing the oil to pass through. The solvents used to elute out both oil and carotene are non-toxic, can be removed by an evaporator and are considered safe for use in producing edible oil.

Using this process, palm carotene was successfully concentrated to about 160 times its original concentration in CPO. More than 90% of the oil was removed without altering the triglyceride profile of the oil. By manipulating the column temperature and CPO loading onto the column, 85% of carotenes were recovered. Only a chromatographic column needs to be inserted in the present palm oil refining process. The addition of an evaporator and a distillation column for solvent removal and solvent regeneration would enable the solvent to be recycled and save cost.

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